

PROTECTIVE IRRIGATION WORKS,

RAJPUTANA,

MANDAWAR PROJECT,

ALIGARH PARĠĀNAH,

TONK STATE.

1905.

AJMER:
SCOTTISH MISSION INDUSTRIES CO., LTD.

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INDEX.

PARA.		PAGE.
1.	Project described	1
2.	Catchment Area and Water available for Storage ...	1
3.	Water-spread and Capacity	1
4.	Maximum Discharge and Length of Weir ...	2
5.	Dam	2
6.	Sluice	2
7.	Design for Sluice	3
8.	Irrigation Channel	3
9.	Abstract Estimate of Cost	3
10.	Revenue	3
11.	Materials	3
12.	Preparation of Project	3
13-18.	Specification	3, 4

ABSTRACT ESTIMATE OF COST.

PLANS.

- I.—Index Map and Contour Plan.
- II.—Plan and Longitudinal Sections.
- III.—Cross Sections of Dam.
- IV.—Detail of Sluice.

MANDAWAR PROJECT, ALIGARH PARGANAH, TONK STATE.

Reference.—Para. 39 Report on Irrigation in the Tonk State.

REPORT.

Mandawar is a khalsa village, about six miles south-east of Aligarh. The village stands on a high mound, and at the foot of the eastern slope a nullah passes down to the south towards Sop. The tributaries forming this nullah rise about 1½ miles to the north, and unite just above the village, and have cut up the ground in their course, and the land in consequence is broken and unculturable.

Project described.

There is an old naddi on the right bank of the nullah, and also lower down the remains of a broken Dam, but no attempt has been made to bund the nullah itself.

This estimate provides for this, as by forming a small Tank the land in the bed which is now broken would silt up and become culturable; and the small area of khalsa land below could be irrigated.

The Dam would be entirely of earthwork, so will be most suitable for a relief work even if the project is not carried out before.

2. The catchmont area is 2½ square miles, and 10 per cent. of the average rainfall of 25 inches may be calculated on as available for storage, or 14·6 m.c.ft.

Catchment Area and Water available for Storage.

3. The following table gives the water-spread and capacity of the proposed Tank at the different contours; R. L. 100 has been taken as the level of the bed of the nullah at the site of the Dam:—

Water-spread and Capacity.

R. L.	Water-spread in s.ft.	Capacity in m.c.ft.
120	6,880,000	<div> <div>28·30</div> <div>7·96</div> <div>8·22</div> <div>6·30</div> <div>·93</div> </div>
115	4,440,000	
113	3,520,000	
110	1,960,000	
105	560,000	
100	(Bed level).	

It is proposed to make Weir level R. L. 113; the Tank will then have a capacity of 15.45, slightly in excess of the amount estimated as available for storage.

Maximum
Discharge
and Length
of Weir.

4. The maximum discharge from the $2\frac{1}{2}$ square miles of catchment is 1,642 cusecs (Dicken's Formula).

It is proposed to make the Weir at the west end of the Dam 300 ft. in length, by removing a portion of the old breached Dam, and with this length the flood water will spill over, with a head not exceeding $1\frac{1}{2}$ ft. As the soil is light, to prevent cutting away the Weir will consist of a masonry wall 2 ft. thick taken down 3 ft. below the ground surface, then an apron 10 ft. wide of dry stone pitching, 1 ft. deep, with a row of blocks of concrete, each block about $5\frac{1}{2}$ ft. \times $2\frac{1}{2}$ ft. \times 3 ft., in rear. The natural surface of the ground on either side the weir will also be pitched up to R. L. 114.50.

The flood water will pass down into the nullah north of the village, as the ground, which is waste land, slopes down very quickly from the site of the Weir.

Dam.

5. The Dam starts from the old breached Dam on the right bank, crosses the nullah, and is continued till high ground on the left bank is reached.

It is 2,850 r.ft. in length, and will consist of earthwork above, with crest R.L. 117.50, or 3 ft. above flood level and $4\frac{1}{2}$ ft. above Weir. The top width is 10 ft., and the front and rear slopes 3 to 1 and 2 to 1 respectively.

Where nullahs are crossed the sand in the bed will be removed for 4 ft. in depth for the whole width of the Dam, and be replaced by good earth.

Sluice.

6. A Sluice is provided on the left bank of the nullah at chainage 3,600, with sill level R. L. 105; this gives 14.5 m.c.ft. of water available for irrigation, sufficient for 145 acres; and there are about 150 acres of land commanded on this side the nullah, of which 69 acres are khalsa.

The Sluice should be able to give a first watering of 6 inches in 30 days of 12 hours' flow for the whole 145 acres for which there is water when the Tank is full, or $D = \frac{145 \times 43,560 \times \frac{1}{2}}{30 \times 12 \times 60 \times 60} = \frac{3,150,100}{1,296,000} = 2.4$ cusecs; or it should discharge 3.11 m.c.ft. of water during the month.

For the next three months of the Rabi Irrigation season it should be able to discharge the balance of the water required with continuous flow,

$$\text{or } D = \frac{\text{M. C. FT. } (14.5 - 3.11)}{3 \times 2.592} = \frac{11.39}{7.776} = 1.46 \text{ cusecs.}$$

A 6-inch dia. Sluice will discharge 2.4 cusecs with the mean head of 4 ft., and 1.2 cusecs with a 1-ft. head, so has been provided.

7. The Sluice consists of a masonry Sluice well, with a Core-wall Design for Sluice. for 20 ft. in length in rear on either side, to prevent any chance of the water creeping round between the well and the earthen Dam; and is similar in design to the Sluice provided in the Kamaria and Rajmanpura Projects for this Parganah.

The foundations are taken down a depth equal to half the depth of the water against the face of the Dam, and consist of a bed of concrete 3 ft. thick on which the masonry flooring will be built.

8. The Irrigation Channel has been set out for 6,300 r.ft. in length, Irrigation Channel. with a fall of 1 ft. per mile. To discharge 2.4 cusecs it must have a bed width of 2 ft., depth of 1½ ft., and side slopes of 1 to 1.

9. The following is the Abstract Estimate of cost of the Project:— Abstract Estimate of Cost.

	Rs.
1. Dam	5,716
2. Weir	1,135
3. Sluice	961
4. Irrigation Channel	132
5. Contingencies	397
Total	8,341

10. If all the 145 acres, for which there is water when the Tank is Revenue. full, are irrigated, allowing Rs. 4 per acre—the difference of assessment between irrigated and unirrigated land in the Parganah—a revenue of Rs. 580 would be realized, or a profit of nearly 7 per cent on the outlay.

11. Stone and lime will have to be brought from Sop, a distance of Materials. two miles.

12. The surveys were made by Sub-Overseer Sham Singh and the Plans and Estimate worked out by Overseer Mannu Lal, under the directions of the Superintending Engineer, Protective Irrigation Works, Rajputana. Preparation of Project.

SPECIFICATION.

13. All the dimensions and measurements of the work are given in the Plans and Estimate, and are to be strictly adhered to. Dimensions

14. The centre line and slopes of Dam to be marked out with trenches 1 ft. deep and 1 ft. broad, showing permanently the inner and outer slopes and the breadth of the top of embankment. Marking out.

15. Before any new earth is commenced the old surface to be carefully picked up at least 9 inches and all roots and grass removed. The new earth to be then thrown down in 9-inch layers and each layer carefully consolidated before the next is commenced. No clods to be allowed. All layers to be laid concave, that is lower in the centre. No earth to be excavated within 100 ft. of either toe of the slope. Earthwork.

Masonry.

16. The masonry of the Weir, and outlet Sluice, to be of rubble stone set in lime mortar; only hard and durable stones to be used, and the masonry to be kept wet during construction. All the stones to be hammer-dressed and to break joint in the same as well as in the successive courses.

All stones are to be laid on their natural beds; where there is batter the beds of the stones are to be at right angles to the batter. Hollows between the larger stones to be filled in with smaller ones completely embedded in mortar. No empty hollow to be left, nor spaces filled wholly with mortar or rubbish where pieces of stones ought to have been inserted.

The faces of the masonry in contact with the earth to be left quite rough, and those remaining exposed to be smoothed and pointed with lime mortar.

Concrete.

17. Concrete to consist of 3 parts broken stones to 1 part lime mortar, well mixed together before putting in foundations; and to be laid in 6-inch layers and well consolidated.

Lime
Mortar.

18. Mortar to consist of 1 part lime to $1\frac{1}{2}$ parts clear sand or surkee; the lime to be of good hard kunkar burnt in wood-fuel, cow-dung to be only used for igniting the fire.

F. St.-G. MANNERS SMITH,
SUPERINTENDING ENGINEER,
Protective Irrigation Works, Rajputana.

AJMER,

Dated 11th August 1905.

ABSTRACT ESTIMATE OF COST.

Mandawar Project, Bonk State.

Quantity or No.	Items.	Rate.	Per	Amount.	
		Rs. A.		Rs.	
	(1) DAM.				
	(a) EMBANKMENT.				
1,115,280 c.ft.	Earthwork	5 0	1,000	5,570	
20,000 "	Removing sand and replacing good earth	7 0	1,00	140	5,716
	(2) WEIR.				
8,100 c.ft.	Removing old earth	3 0	1,00	24	
2,650 "	Excavation	4 0	1,00	11	
1,280 "	Concrete	10 0	100	128	
1,920 "	Masonry	16 0	100	307	
22,150 "	Stone Pitching	3 0	100	665	1,135
	(3) SLUICE.				
3,548 c.ft.	Excavation	4 0	1,000	14	
1,721 "	Concrete	10 0	100	172	
2,350 "	Masonry	16 0	100	376	
211 "	Arch Masonry	18 0	100	38	
81 "	Stone Pitching	3 0	100	2	
20 s.ft.	Stone Slab	0 8	s.ft.	10	
2 Nos.	Stone Brackets	2 0	each	4	
16 c.ft.	Woodwork	3 0	c.ft.	48	
28 s.ft.	Iron Grating with Vertical Bars	1 0	s.ft.	28	
50 r.ft.	Rod Iron 1" dia.	0 4	r.ft.	13	
6 "	Steel Girder	1 0	r.ft.	6	
1 No.	Sluice pipe 6" dia., complete ..	250 0	each.	250	961
	(4) IRRIGATION CHANNEL.				
33,075 c.ft.	Excavation	4 0	1,000	132	132
	Total	7,944
	Contingencies	5 0	100	...	397
	GRAND TOTAL	8,341